HERMAPHRODITISM IN ONE SPARIDAE OF THE PERSIAN GULF : *ACANTHOPAGRUS BIFASCIATUS* (FORSSK.)

by

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RÉSUMÉ. – Un ensemble de 28 *Acanthopagrus bifasciatus* (Forssk.) a été collecté sur le marché aux poissons de Duha au Qatar. D'après mes études histologiques, nous avons observé trois sortes de gonades : des testicules adultes accompagnés d'un tissu ovarien, quelques ovaires avec un reste de tissu mâle dégénéré et enfin un nombre important d'ovaires sans aucune trace d'hermaphrodisme. Certains individus de cette espèce présentent des gonades correspondant à un gonochorisme secondaire.

SUMMARY. – 28 specimens of *Acanthopagrus bifasciatus* (Forssk.) were collected from the fish market of Duha in Qatar. Histological study showed three kinds of gonads : in a few cases, testes with ovarian tissue or ovaries with a degenerated testicular part, and in many cases ovaries without testicular rudiment. Some specimens of this species, show a sign of secondary gonochorism.

Recently, many workers have become interested in the biology of hermaphroditic fish. Sex reversal is widespread in a number of fish of the Sparidae family. This sex reversal covers all aspects of hermaphroditic function : protandry and protogyny (Kinoshita, 1939 ;D'Ancona, 1949 ; Reinboth, 1962 ; Atz, 1964 ; Reinboth, 1975 ; Sellami and Brusle, 1975 and Zohar, Abraham and Gordin, 1978).

There are ten or eleven species of Porgies (Sparidae) in the Persian Gulf (Randall *et al.*, 1978 and Bauchot, personal communication). The sexuality of one of them has been recently studied (Etessami and Pousty, 1979). The present study deals with another of these Sparids.

Material and Methods

Acanthopagrus bifasciatus (Forssk., 1775) is rarely seen near the Iranian coasts. It occurs mainly in the Western and Northern Indian Ocean and in the Indo-Malayan waters (Smith , 1965).

From March to September 1980, 28 *Acanthopagrus bifasciatus* were collected from the fish market of Duha in Qatar. Unfortunately we were unable to obtain live fish. The total length of each fish was measured and the gonads were removed and fixed in Bouin's solution. They were later embedded in filtered paraffin, sectioned at µm and stained with hematoxylin-eosin.

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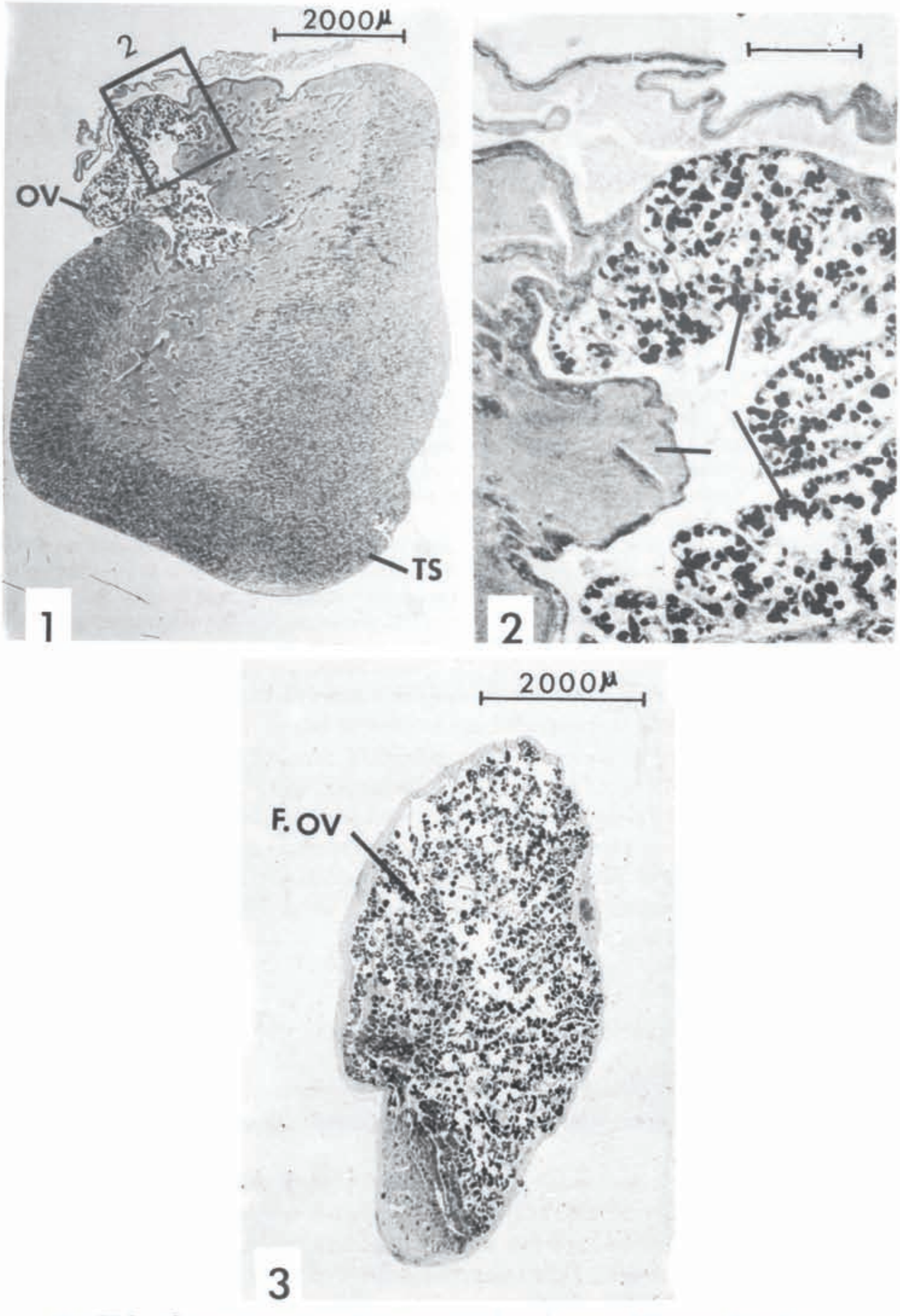

PLATE I. – Cross sections through the gonad of *Acanthopagrus bifasciatus* (Forssk.)

1 : functional male with non functional female portion.
2 : cross section through the ovarian and testicular parts of Fig. 1.
3 : functional ovary without testicular part.
F. OV : functional ovary ; OV : ovarian portion ; TS : testicular part.

TABLE I : Number of males and females of *Acanthopagrus bifasciatus* (Forssk.) in different size classes, collected from March to September 1980.

Size classes in mm	Number of ambosexual males	Number of secondary females	Number of pure females	Total
180 - 199	2	–	–	2
200 - 219	2 + 1 *	1	2	6
220 - 239	2 + 1 *	4	4	11
240 - 259	1 + 1 *	–	4	6
260 - 279	–	–	1	1
280 - 299	–	–	–	–
300 - 319	–	–	–	–
320 - 339	–	–	–	–
340 - 349	–	–	2	2
Total	10	5	13	28

* Functional male ovotestis in which male and female parts were of about the same size.

Results

The histological studies of gonads in this fish, which lacks any sexual dimorphism, show three kinds of reproductive glands :

a) Functional ambosexual (Reinboth, 1969) testes, which present the typical organisation of Sparid-pattern gonads (D'Ancona, 1949b) : the male tissue is in a ventro-lateral position and the ovary is dorsal (Plate I, Fig. 1). The ovary is smaller than the testicular part, except in three specimens collected in April and September, in which male and female part were of approximately the same size. The testicular portion is very developed, particularly in the period of reproduction (March-July). As regards female tissue, the development of oocytes in the ovarian lamellae is stopped in the early stage of gametogenesis (Plate 1, Fig. 2).

b) Functional ovary with a degenerated testicular part in the ventro-lateral position.

c) Functional ovary without any sign of a degenerated testicular part (Plate I, Fig. 3).

The number of males and females in different size classes is listed in Table I.

Discussion

By histological study of 28 gonads (10 males and 18 females) of *Acanthopagrus bifasciatus* (Forssk.), four different stages of gonadal evolution were identified :

1) functional male ovotestis which presents the typical pattern of hermaphrodite Sparidae gonads with a predominant testicular part.

2) functional male ovotestis in which male and female parts are about the same size. This case has been mentioned in *Boops salpa* (Linnaeus, 1758) by Sellami and Brusle (1975).

3) ovaries with testicular rudiment in ventro-lateral position, in a small number of cases.

4) no apparent degenerated testicular part in a large number of ovaries.

The three first cases argues for protandric sex inversion in this species. However the fourth category (oldest females without testicular tissue), the sex ratio, 18 ♀ / 10 ♂, and the presence of males only among the smaller specimens recall a special type of gonochorism found in another *Acanthopagrus, Mylio macrocephalus* (Okada, 1965a, b) and described as «female secondary gonochorism». The difference between our species and *Mylio macrocephalus* is the presence of a small number of functional females with an apparently degenerated testicular part. These females may pass through a functional male stage, before reaching their definitive sexuality. A case of a rudimentary hermaphroditism (male secondary gonochorism) has been observed in a protogynous Maenidae : *Maena maena* (Linnaeus, 1758) by Sellami and Brusle (1979).

In conclusion, some specimens of the apparently protandric species, show a sign of secondary gonochorism.

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